COSEWIC
Status Appraisal Summary

on the

Incurved Grizzled Moss
Ptychomitrium incurvum

in Canada

EXTIRPATED
2012

COSEWIC
Committee on the Status
of Endangered Wildlife
in Canada

COSEPAC
Comité sur la situation
des espèces en péril
au Canada

COSEWIC status appraisal summaries are working documents used in assigning the status of wildlife species suspected of being at risk in Canada. This document may be cited as follows:

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For additional copies contact:

COSEWIC Secretariat
c/o Canadian Wildlife Service
Environment Canada
Ottawa, ON
K1A 0H3

Tel.: 819-953-3215
Fax: 819-994-3684
E-mail: COSEWIC/COSEPAC@ec.gc.ca
http://www.cosewic.gc.ca

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COSEWIC
Assessment Summary

Assessment Summary – May 2012

Common name
Incurved Grizzled Moss

Scientific name
Ptychomitrium incurvum

Status
Extirpated

Reason for designation
This small moss is widely distributed in the deciduous forests of eastern North America, with a frequency of occurrence that declines toward the northern portion of its range. In Canada, the only known record for the species is from the Carolinian zone of southern Ontario (Niagara Falls) in 1825. Despite considerable search effort in the region, the species has never been rediscovered.

Occurrence
Ontario

Status history
Designated Extirpated in November 2002. Status re-examined and confirmed in May 2012.

COSEWIC
Status Appraisal Summary

Ptychomitrium incurvum
Incurved Grizzled Moss — Ptychomitre à feuilles incurvées
Range of occurrence in Canada: Ontario

Current COSEWIC Assessment:

Status category:
☒ XT ☐ E ☐ T ☐ SC

Date of last assessment: November 2002

Reason for designation at last assessment:
A small moss that is widely distributed in the deciduous forests of eastern North America, and whose frequency of occurrence is more toward the northern portion of its range. In Canada, the only known location for the species is a single record from a boulder in southern Ontario in 1828. Despite many years of collection made in the region, the species has never been rediscovered.

Criteria applied at last assessment: N/A; 186 years have passed since the last credible record of the wildlife species, despite bryological activities in the region.

SSC Recommendation:

☒No change in status and criteria

☐No change in status, new criteria

Evidence (indicate as applicable):

Wildlife species:

Change in eligibility, taxonomy or designatable units: yes ☐ no ☒

Explanation:

Ptychomitrium incurvum is the current accepted name for a valid taxon (Reese 2007; Missouri Botanical Garden 2011) that has been recognized since 1823. Its nativity in Canada is based on a confirmed herbarium specimen (CANM 152283) collected in 1825 at Niagara Falls. There, owing to the sessile nature of bryophytes and the proximity of southern Ontario to northeastern US states of native occurrence, it is presumed to have regularly occurred and to have relied on Canadian habitat throughout its life cycle.

Although the original assessment specifies 1828 as the year of collection, this was the date of publication of the exsiccati of which this specimen forms a part, rather than the collecting date. Based on the itinerary of the Franklin Expedition of which the collector, Thomas Drummond, was Assistant Naturalist (Franklin 1828; Bird 1967), the specimen would have been collected between March 15 and April 15, 1825, when the group was travelling between New York and Penetanguishene.

It seems highly plausible that Drummond was on the Canadian side of the international border when he made the collection. Niagara Falls is a discrete, localized, unambiguous landmark on the international border, and the locations of recent and historical US records of this species make its

occurrence in Canada likely. Furthermore, Franklin's (1828) mention of the site strongly suggests his party was in present-day Canada: "From Albany, we travelled through Utica, Rochester, and Geneva, to Leweston, ... and, crossing the river Niagara, entered Canada, and visited the Falls so justly celebrated as the first in the world for grandeur."

Range:

Change in Extent of Occurrence (EO):	yes ☐ no ☒ unk ☐
Change in Index of Area of Occupancy (IAO) :	yes ☐ no ☒ unk ☐
*Change in number of known or inferred current locations**:	yes ☐ no ☒ unk ☐
Significant new survey information:	yes ☐ no ☒

Explanation:

No new Canadian collections of *Ptychomitrium incurvum* have been reported at ACAD, ALTA, CANM, NY, NYS, MICH, MO, MSU, PH, UBC, UWO, VT or at the Ontario Natural Heritage Information Centre. A 1943 Quebec record at NBM is presumed, based on recent work by the Société Québecoise de Bryologie in preparing the bryophyte flora of Quebec-Labrador (Jean Faubert, personal communication) and by Environment Canada (2007), to have been misidentified. OAC could not be checked for collections because the herbarium was being moved at the time that this summary was prepared. *P. incurvum* is not reported for any other Canadian provinces in the 2010 listing of Wild Species in Canada (Canadian Endangered Species Conservation Council 2011). Although the validity of the Vermont record reported in the status report range map (COSEWIC 2002) has been called into question (annotations to herbarium specimen), a 2003 record from that state has been confirmed (Dorothy Allard, pers. comm. 2011).

* Use the IUCN definition of "location"

Population Information:

Change in number of mature individuals:	yes ☐ no ☒ unk ☐
Change in total population trend:	yes ☐ no ☒ unk ☐
Change in severity of population fragmentation:	yes ☐ no ☒ unk ☐
Change in trend in area and/or quality of habitat:	yes ☐ no ☒ unk ☐
Significant new survey information:	yes ☐ no ☒

Explanation:

There has been no change in the documented size of, or trends in, the Canadian population. Despite a relatively long settlement and collection history in southern Ontario, the species has not been recorded since its first, credibly documented, discovery. Although no directed surveys or other recovery activities were recommended in the Recovery Strategy for *Ptychomitrium incurvum* (Environment Canada 2007), Environment Canada (2007) recognizes that it would be "appropriate to monitor and conduct follow-up work on observations reported by individuals during surveys done for other species in southern Ontario". The completion and reporting of such work continues to be an important goal for the recovery of this species in Canada.

Threats:

Change in nature and/or severity of threats:	yes ☐ no ☐ unk ☒

Explanation:

Specific threats accounting for the extirpation of this species are unknown. Due to an apparent decline in herbarium collections from the northern US, it is speculated in the Status Report (COSEWIC 2002) that broad-ranging factors such as climate, acid precipitation and human development may have played a role in the northern part of the species' North American range. The potential negative effects of atmospheric pollution are mentioned in the Recovery Strategy (Environment Canada 2007), and these conditions have generally improved in recent years (e.g., National Atmospheric Deposition Program 2011; Integrated Mapping Assessment Project 2000).

Ptychomitrium incurvum, which exhibits flexibility with respect to substrate type and substrate chemistry (COSEWIC 2002), remained extant in some parts of eastern North America where acid deposition was elevated in the past, suggesting that other factors may help to account for its apparent decline in the north. It is not known whether the recent discovery of *P. incurvum* in Vermont (2003, Dorothy Allard, pers. comm. 2011) and in Ohio (rediscovered in 2006 - NY 829670; all previous records found to date were made 70 or more years ago) are linked to changes in growing conditions or survey patterns or both.

Protection:

Change in effective protection: yes ☒ no ☐

Explanation:

General protection for *Ptychomitrium incurvum* is conferred by its SARA listing (2005) and by Ontario's *Endangered Species Act*, 2007. The greater awareness engendered by its SARA status may promote vigilance for the species among collectors in the region. The historical collecting locality for this species has not been pinpointed and no other Canadian populations have been reported. No recovery activities have been recommended, but the species may still benefit from general conservation programs in the same geographic area. The feasibility of recovery will be reviewed every five years (Environment Canada 2007).

Rescue Effect:

Change in evidence of rescue effect: yes ☐ no ☒

Explanation:

Rescue effect may be limited by the same unknown factors that account for the apparent reduction in herbarium reports for the northern US over the past 50-100 years, and for the species' SH (historical) status in New York. Immigration is possible: this species has small spores (9-13 µm, Crum and Anderson 1981) and is known to produce them commonly (Reese 2007). Habitat seems to exist despite intensive human activity in the region (the species is known to occur on anthropogenic surfaces such as stone walls and gravestones, as well as in natural habitats). The reported contemporary US occurrences that are nearest to Canada are in Ann Arbor, Michigan, about 70 km directly west from Windsor, Ontario (MICH 512701, collected in1978) and in Vermont, about 200 km south of the Quebec border (Dorothy Allard, pers. comm. 2011, collected in 2003).

Quantitative Analysis: Not Applicable

Change in estimated probability of extirpation: yes ☐ no ☐ unk ☐

Details:

Summary and Additional Considerations: [e.g., recovery efforts]

Acknowledgements and authorities contacted:

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Allard, Dorothy. University of Vermont Herbarium (VT)

Andreas, Barbara. Bryologist and Curator, Kent State University Herbarium (KE)

Belland, René. Curator, Plant Herbarium, Devonian Botanic Garden, University of Alberta

Bowles, Jane. Curator, University of Western Ontario Herbarium (UWO)

Brouillet, Luc. Curator, Herbier Marie-Victorin, Institut de recherche en biologie végétale, Université de Montréal (MT)

Clayden, Stephen. Curator, New Brunswick Museum Herbarium (NBM)

Eckel, Patricia. Research Scientist, Bryology Group, Missouri Botanical Garden

Faubert, Jean. Président, Société Québecoise de Bryologie

Fortin, Lucie. Volunteer, Herbier Marie-Victorin, Institut de recherche en biologie végétale, Université de Montréal (MT)

Freire-Fierro, Alina. Collection Manager, Philadelphia Academy of Natural Sciences Herbarium (PH)

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LaFarge, Catherine. Curator and Director, Cryptogamic Herbarium, University of Alberta (ALTA)

Lee, Olivia. Collection Manager, Lichens, Bryophytes and Fungi, UBC Herbarium, Beatty Biodiversity Museum (UBC)

Miller, Norton. Curator Emeritus (Bryology), New York State Museum (NYS)

Newell, Ruth. Curator, Acadia University Herbarium (ACAD)

Oldham, Mike. Ontario Natural Heritage Information Centre, Ontario Ministry of Natural Resources

Payette, Serge. Curator, Herbier Louis-Marie, Université Laval (QFA)

Rabeler, Richard. Collections Manager, University of Michigan Herbarium (MICH)

Van Allen, Kari. Species at Risk Biologist, Canadian Wildlife Service, Environment Canada (currently representing the Recovery Team)

Information sources:

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TECHNICAL SUMMARY

Ptychomitrium incurvum
Incurved Grizzled Moss — Ptychomitre à feuilles incurvées
Range of occurrence in Canada: Ontario

Demographic Information

Generation time *Inferred based on colonist life strategy (Söderström 2006)*	6-10 years
Is there an observed, inferred, or projected continuing decline in number of mature individuals?	no
Estimated percent of continuing decline in total number of mature individuals	N/A
Percent change in total number of mature individuals over the last 10 years, or 3 generations.	N/A
Percent change in total number of mature individuals over the next 10 years, or 3 generations.	N/A
Percent change in total number of mature individuals over any 10 years, or 3 generations period, over a time period including both the past and the future.	N/A
Are the causes of the decline clearly reversible and understood and ceased? *Not understood, and therefore not known to be reversible or to have ceased*	no
Are there extreme fluctuations in number of mature individuals?	no

Extent and Occupancy Information

Estimated extent of occurrence	0 km²
Index of area of occupancy (IAO) (Always report 2x2 grid value).	0 km²
Is the total population severely fragmented?	no
Number of locations*	0
Is there a continuing decline in extent of occurrence?	no
Is there a continuing decline in index of area of occupancy?	no
Is there a continuing decline in number of populations?	no
Is there a continuing decline in number of locations*?	no
Is there a continuing decline in area, extent and/or quality of habitat?	no
Are there extreme fluctuations in number of populations?	no
Are there extreme fluctuations in number of locations*?	no
Are there extreme fluctuations in extent of occurrence?	no
Are there extreme fluctuations in index of area of occupancy?	no

Number of Mature Individuals (in each population)

Population	N Mature Individuals
The only known population was historically documented (1825), and its size was not recorded	0
Total	0

* See Definitions and Abbreviations on COSEWIC website and IUCN 2010 for more information on this term.

Quantitative Analysis

Probability of extinction in the wild is at least [20% within 20 years or 5 generations, or 10% within 100 years].	N/A

Threats (actual or imminent, to populations or habitats)

No current general or specific threats have been identified.

Rescue Effect (immigration from outside Canada)

Status of outside population(s)?
Globally apparently secure.
Not nationally ranked in the United States.
US subnational ranks (NatureServe, 2011):
Delaware (S1S2)
Georgia (SNR)
Indiana (SNR)
Michigan (SNR; Population recorded in Ann Arbor, 70 km from Windsor, Ontario in 1978)
New York (SH)
Tennessee (S3)
Vermont (S1; Population recorded in Dorset, 200 km from the Quebec border in about 2000)
Virginia (SNR)

Bryophyte species appear not to be ranked in Maine or Pennsylvania (Pennsylvania Natural Heritage Program, 2011). The species is not listed among rare plants of Ohio (Ohio Department of Natural Resources, 2011)

Is immigration known or possible?	Possible spore dispersal from US populations
Would immigrants be adapted to survive in Canada?	Unknown
Is there sufficient habitat for immigrants in Canada?	Yes, assuming threats have ceased
Is rescue from outside populations likely?	Unknown

Current Status

COSEWIC: Extirpated (2002, 2012)

Additional Sources of Information:

Status and Reason for Designation

Status: Extirpated	**Final Criteria:** Not applicable
Status History: Designated Extirpated in November 2002. Status re-examined and confirmed in May 2012.	
Reason for Designation: This small moss is widely distributed in the deciduous forests of eastern North America, with a frequency of occurrence that declines toward the northern portion of its range. In Canada, the only known record for the species is from the Carolinian zone of southern Ontario (Niagara Falls) in 1825. Despite considerable search effort in the region, the species has never been rediscovered.	

Applicability of Criteria

Criterion A: Criterion does not apply; no Canadian observations of this species since 1825.
Criterion B: Criterion does not apply; no Canadian observations of this species since 1825.
Criterion C: Criterion does not apply; no Canadian observations of this species since 1825.
Criterion D: Criterion does not apply; no Canadian observations of this species since 1825.
Criterion E: Criterion does not apply; no Canadian observations of this species since 1825.

COSEWIC HISTORY

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list. On June 5, 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal entities (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biodiversity Information Partnership, chaired by the Canadian Museum of Nature), three non-government science members and the co-chairs of the species specialist subcommittees and the Aboriginal Traditional Knowledge subcommittee. The Committee meets to consider status reports on candidate species.

DEFINITIONS
(2012)

Wildlife Species	A species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)**	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD)***	A category that applies when the available information is insufficient (a) to resolve a species' eligibility for assessment or (b) to permit an assessment of the species' risk of extinction.

* Formerly described as "Vulnerable" from 1990 to 1999, or "Rare" prior to 1990.

** Formerly described as "Not In Any Category", or "No Designation Required."

*** Formerly described as "Indeterminate" from 1994 to 1999 or "ISIBD" (insufficient scientific information on which to base a designation) prior to 1994. Definition of the (DD) category revised in 2006.

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